D'où

$$I = \left[-2xe^{-x}\right]_1^2 - \int_1^2 (-2e^{-x}).dx$$

$$I = \frac{2}{e} - \frac{4}{e^2} - \left[2e^{-x}\right]_1^2$$

$$I = \frac{2}{e} - \frac{4}{e^2} - \frac{2}{e^2} + \frac{2}{e}$$

$$\boxed{I = \frac{4}{e} - \frac{6}{e^2}}$$

b) $I = \int_0^1 x^3 e^{-x^2}.dx$

$$\begin{cases} u'(x) = x e^{-x^2} \rightarrow u(x) = -\frac{1}{2} e^{-x^2} \\ v(x) = x^2 \rightarrow v'(x) = 2x \end{cases}$$

$$I = \left[-\frac{x^2}{2}e^{-x^2}\right]_0^1 + \int_0^1 xe^{-x^2}.dx$$

$$= \left[-\frac{x^2}{2}e^{-x^2}\right]_0^1 - \frac{1}{2}\int_0^1 -2xe^{-x^2}.dx$$

$$= \left[-\frac{x^2}{2}e^{-x^2}\right]_0^1 - \frac{1}{2}\left[e^{-x^2}\right]_0^1$$

$$\boxed{I = \frac{1}{2} - \frac{1}{e}}$$

c) $I = \int_0^{Ln2} e^{-x}.Ln(1+e^x).dx$

$$\begin{cases} v(x) = Ln(1+e^x) \rightarrow v'(x) = \frac{e^x}{1+e^x} \\ u'(x) = e^{-x} \rightarrow u(x) = -e^{-x} \end{cases}$$

$$I = \left[-e^{-x}Ln(1+e^x)\right]_0^{Ln2} + \int_0^{Ln2} \frac{1}{1+e^x}.dx$$

$$= Ln2 - 2\,Ln(1+e^{-Ln2}) + \int_0^{Ln2} \frac{e^{-x}}{1+e^{-x}}.dx$$

$$= Ln2 - 2\,Ln\frac{3}{2} + \left[-Ln(1+e^{-x})\right]_0^{\ln 2}$$

$$\boxed{I = 5\ln 2 - 3Ln3}$$

d) $I = \int_1^0 x^2 e^x.dx$

$$\begin{cases} u'(x) = e^x \rightarrow u(x) = e^x \\ v(x) = x^2 \rightarrow v'(x) = 2x \end{cases}$$

$$I = \left[x^2 e^x\right]_1^0 - \int_1^0 2xe^x.dx$$

$$I = -e - \int_1^0 2xe^x.dx$$

$$\begin{cases} u'(x) = e^x \rightarrow u(x) = e^x \\ v(x) = 2x \rightarrow v'(x) = 2 \end{cases}$$

$$I = -e - \left(\left[2xe^x\right]_1^0 - \int_1^0 2e^x.dx\right)$$

$$I = -e - \left(-2e - \left[2e^x\right]_1^0\right). \boxed{I = 2 - e}$$

e) $I = \int_0^{\frac{\pi}{2}} (e^{-x}\sin x).dx$

$$\begin{cases} v(x) = \sin x \rightarrow v'(x) = \cos x \\ u'(x) = e^{-x} \rightarrow u(x) = -e^{-x} \end{cases}$$

$$I = \left[-\sin x.e^{-x}\right]_0^{\frac{\pi}{2}} + \int_0^{\frac{\pi}{2}} (e^{-x}\cos x).dx$$

$$I = -e^{-\frac{\pi}{2}} + \int_0^{\frac{\pi}{2}} (e^{-x}\cos x).dx$$

$$\begin{cases} v(x) = \cos x \rightarrow v'(x) = -\sin x \\ u'(x) = e^{-x} \rightarrow u(x) = -e^{-x} \end{cases}$$

$$I = -e^{-\frac{\pi}{2}} + \left(\left[-\cos x.e^{-x}\right]_0^{\frac{\pi}{2}} + \int_0^{\frac{\pi}{2}} (e^{-x}\sin x).dx\right)$$

$$I = -e^{-\frac{\pi}{2}} + (1+I) \Rightarrow 2I = 1 - e^{-\frac{\pi}{2}}$$

$$\boxed{I = \frac{1}{2}(1 - e^{-\frac{\pi}{2}})}$$

Qarray.tn -Aqra Blech- Qarray.tn